CHEST Online Supplement

The Research Agenda in ICU Telemedicine

A Statement From the Critical Care Societies Collaborative

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e-Appendix 1.

LITERATURE REVIEW

Authors' Note: The following literature review was developed by the Working Group Chairs and provided to the Working Group participants prior to the conference. For complete citations please refer to the primary manuscript.

ICU TELEMEDICINE LITERATURE REVIEW
For: The Research Agenda in ICU Telemedicine
AHRQ Research Conference
March 24 – 25, 2010
Northbrook, IL

Abbreviations: APACHE = acute physiology and chronic health evaluation; CI = confidence interval; ICU = intensive care unit; ; IT = information technology; PRISM = pediatric risk of mortality; SAPS = simplified acute physiology score; SMR = standardized mortality ratio; RR = relative risk.

Original research, primary outcomes-based evaluation

1. Rosenfeld, et. al. Critical Care Medicine, 2000: Intensive care unit telemedicine: alternate paradigm for providing continuous intensive care.
- Study design: before-after
- Setting: surgical ICU of an academic medical center
- System design: continuous off-site intensivist physician monitoring
- Patients: 628 (427 in pre-implementation, 201 post-implementation)
- Time-period: 32 weeks in pre-implementation, 16 weeks in post-implementation
- Primary findings: The APACHE III standardized mortality ratio (ratio of observed to predicted mortality) was lower in post-implementation (0.71) period compared to two pre-implementation periods (1.07 and 1.02).
- Other notes: Patients in post-implementation period experienced fewer ICU-related complications and lower unadjusted total costs.

2. Breslow, et al. Critical Care Medicine, 2004: Effect of a multiple intensive care unit telemedicine program on clinical and economic outcomes.
- Study design: before-after

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- Setting: surgical and medical ICUs of a community tertiary care hospital
- System design: continuous off-site intensivist monitoring
- Patients: 2140 (1396 in pre-implementation, 744 in post-implementation)
- Time-period: 12 months in pre-implementation, 6 months in post-implementation
- Primary findings: Decrease in unadjusted in-hospital mortality after implementation (12.9% vs. 9.4%, RR: 0.73, 95% CI: 0.55 – 0.95). Severity of illness was similar between the two time periods (acute physiology score 38.6 vs. 37.8).
- Other notes: Patients in post-implementation period experienced shorter unadjusted ICU length of stay and lower unadjusted average costs. In a subgroup analysis, the relative unadjusted mortality benefit was statistically significant in the medical ICU but not the surgical ICU.

3. Marcin, et al. Journal of Pediatrics, 2004. Use of telemedicine to provide pediatric critical care inpatient consultations to underserved rural Northern California.
- Study design: before-after
- Setting: Community hospital without dedicated pediatric intensivists
- System design: periodic on-demand intensivist consultation, compared to on-site pediatric intensivist in pre-implementation period
- Patients: 296 (116 in pre-implementation, 180 in post-implementation)
- Time-period: 12 months pre-implementation, 24 months post-implementation
- Primary findings: The telemedicine service was consulted on 47/180 (26.1%) patients in the post-implementation period. The PRISM-III standardized mortality ratio was similar between the telemedicine period (0.36) and the pediatric intensivist period (0.37). The SMR was lower for consulted patients (0.24) compared to all patients (0.36) in the telemedicine period.
- Other notes: 3 patients in the intervention period required transport to the tertiary care referral center despite telemedicine consult. Overall satisfaction with program among nurses, physicians and parents was high. Nurses valued staying locally more than physicians or parents.

4. Zawada, et al. South Dakota Medicine, 2006. Prognostic outcomes after the initiation of an electronic telemedicine intensive care unit (eICU) in a rural health system.
- Study design: after-only
- Setting: ICUs in 5 rural hospitals
- System design: continuous off-site intensivist monitoring
- Patients: not-reported
- Time-period: 4 months
- Primary findings: During time period with ICU telemedicine APACHE III adjusted standardized mortality ratio was less than 1.0 for all five hospitals (range 0.0 to 0.51) and for the health system overall (0.46). ICU and hospital length of stay were also less than expected by APACHE III.

5. Zawada, et al. Post-graduate medicine, 2009. Impact of an intensive care unit telemedicine program on a rural health care system. [N.B. May contain duplicated results as Zawada, 2006]
- Study design: before-after
- Setting: ICUs in 14 hospitals (1 tertiary care, 3 rural regional hospitals, 2 community hospitals, and 9 critical access hospitals).
- System design: continuous off-site intensivist monitoring

- Patients: 5426 (696 pre-intervention, 4730 post-intervention)
- Time-period: 12 months pre-intervention, 2.5 years post-intervention (hospital-specific time ranged from 1 to 21 months)
- Primary findings: In 3 regional hospitals: unadjusted mortality unchanged in 2, lower in 1; decrease in APACHE III observed to expected ICU length of stay; no change in APACHE III observed-to-expected hospital length of stay. In 1 tertiary care center: no change in APACHE III standardized mortality ratio (0.76 to 0.68); decreased APACHE III observed-to-expected ICU length of stay.
- Other notes: Small numbers precluded data analysis at critical access hospitals, however hospital leadership at these hospitals was strongly supportive of the program and perceived lower rates of transfer. Program physicians perceived improved quality with lower risk of physician burnout.

6. Morrison, et al. 2009. Clinical and economic outcomes of the electronic intensive care unit: results from two community hospitals.
- Study design: before-after
- Setting: ICUs in 2 community hospitals
- System design: continuous off-site intensivist monitoring
- Patients: 4088 (1371 pre-implementation, 2657post-implementation)
- Time-period: 4 months pre-implementation, 8 months post-implementation
- Primary findings: No difference in unadjusted or APACHE III adjusted hospital mortality between time periods. No differences in ICU or hospital length of stay between time periods. In a subgroup analysis, hospital length of stay improved over time for patients that were allowed a high compared to a low level of telemedicine involvement.
- Other notes: A minority of patients were allowed a high level of telemedicine involvement in care.

7. Thomas, et al. JAMA 2009. Association of telemedicine for remote monitoring of intensive care patients with mortality, complications and length of stay.
- Study design: before-after
- Setting: ICUs in 5 hospitals (1 tertiary care, 2 large urban, 2 small community)
- System design: continuous off-site intensivist monitoring
- Patients: 4142 (2034 pre-intervention, 2108 post-intervention)
- Time-period: 20 months pre-intervention, 25 months post-intervention
- Primary findings: No change in SAPS II adjusted hospital mortality (RR 0.85, 95% CI: 0.71 to 1.03). Significant interaction between SAPS II score and mortality: benefit in high-risk subset, harm in low-risk subset. No change in unadjusted ICU complication rate (17.9% vs. 19.2%). No effect on ICU or hospital length of stay among survivors.
- Other notes: Given the option, 66.1% of physicians in the post-intervention group allowed only minimal involvement of the telemedicine team (i.e. only for life threatening situations).

8. McCambridge, et al. Archives of Internal Medicine 2010. Association of health information technology and teleintensivist coverage with decreased mortality and ventilator use in critically ill patients..
- Study design: before-after
- Setting: 2 ICUs in 1 hospital
- System design: continuous off-site intensivist monitoring
- Patients: 1913 (954 pre-intervention, 959 post-intervention)
- Time-period: 16 months pre-intervention, 10 months post-intervention
- Primary findings: Decrease in APACHE-adjusted mortality (OR for admission during post-intervention period: 0.61, p=0.02). Decrease in severity-adjusted probability of ventilator use. Time-series analysis

suggested that the observed temporal decrease in mortality was attributable to an event around the implementation period. No effect on ICU length of stay.
- Other notes: The telemedicine intervention was bundled with a comprehensive health IT program that included an electronic medical record, an electronic event warning system, computerized physician order entry, an electronic medication administration record, and bar-coded medication administration. Both ICUs were closed at baseline, and in both telemedicine coverage was mandatory for all patients.

Original research, primary process-based evaluation

1. Grundy et al. Journal of the American College of Emergency Physicians, 1977. Telemedicine in critical care: an experiment in health care delivery.
- Study design: after-only
- Setting: Community hospital ICU linked to academic medical center
- System design: remote robotic telepresence with periodic intensivist rounding
- Patients: 128 patients
- Time-period: 6 months
- Primary findings: Consultant intensivists made 1023 suggestions for care, 430 of which were incorporated (42%). More suggestions were incorporated in the last 3 months compared to the first 3 months (46% vs. 35%). 30 patients refused telemedicine consultation, and for 53 patients the primary physician refused consultation.
- Other notes: In a survey of nursing staff, 88% thought that telemedicine was beneficial for patients, and 70% felt that their knowledge was enhanced by the process.

2. LaMonte et al. Stroke 2003. Telemedicine for acute stroke: triumphs and pitfalls.
- Study design: after-only
- Setting: Community emergency department linked to regional stroke center
- System design: periodic on-demand neurological consultation
- Patients: 50 patients with acute stroke
- Time-period: 3 years
- Primary findings: 21 of 50 patients (42%) received telemedicine consultations. 5 of 21 (23.8%) received intravenous thrombolysis.

3. Rogers et al. Journal of Trauma 2001. The use of telemedicine for real-time video consultation between trauma center and community hospital in a rural setting improves early trauma care.
- Study design: after-only
- Setting: Four community emergency departments linked to regional trauma center
- System design: periodic on-demand trauma surgeon consultation
- Patients: 26 trauma patients
- Time-period: 9 months
- Primary findings: 19 of 26 patients (73%) were ultimately transferred to the regional level 1 trauma center. In two cases telemedicine interventions were subjectively judged to be life-saving.
- Other notes: 83% of referring providers felt the consult improved the quality of care.

4. Marcin et al. Pediatric Critical Care Medicine, 2004. The use of telemedicine to provide pediatric critical care consultations to pediatric trauma patients admitted to a remote trauma intensive care unit.
- Study design: before-after
- Setting: Level II trauma center with pediatric intensivists
- System design: periodic on-demand intensivist consultation
- Patients: 224 (127 pre-implementation, 97 post-implementation)
- Time-period: 33 months pre-implementation, 25 months post-implementation
- Primary findings: 17 of 97 post-implementation patients (17.5%) received telemedicine consultations. Parents and providers expressed high levels of satisfaction with telemedicine care.

5. Vespa, et al. Surgical Neurology, 2007. Intensive care unit robotic telepresence facilitates rapid physician response to unstable patients and decreased costs in neurointensive care.
- Study design: before-after
- Setting: Neurological ICU in a single academic medical center
- System design: remote robotic telepresence with periodic rounding and on-call availability
- Patients: 1218 (578 pre-implementation, 640 post-implementation)
- Time-period: 12 months pre-implementation, 12 months post-implementation
- Primary findings: Decreased time to evaluation by an attending physician in response to critical events in the telemedicine period
- Other notes: Post-implementation period associated with reduction in unadjusted ICU length of stay

6. Westbrook, et al. Medical Journal of Australia, 2008. Impact of an ultrabroadband emergency department telemedicine system on the care of acutely ill patients and clinicians' work.
- Study design: before-after
- Setting: emergency department of an 85-bed community hospital with no ICU
- System design: periodic on-demand emergency medicine physician consultation
- Patients: 350 (169 pre-implementation, 181 post-implementation); high-risk patients only
- Time-period: 12 months pre-implementation, 18 months post-implementation
- Primary findings: No change in overall transfer to tertiary care hospital (38% pre- and post-implementation). No change in intubation rate, central venous access or administration of ionotropes.
- Other notes: Community hospital physicians reported feelings of greater support but less autonomy.

7. LaMonte et al. Telemedicine and E-health, 2008. Outcomes from a comprehensive stroke telemedicine program.
- Study design: Case-control
- Setting: State-wide stroke network
- System design: periodic on-demand neurological consultation
- Patients: 58 (27 receiving face-to-face neurological consult, 21 receiving telemedicine-based neurological consult)
- Time-period: not reported
- Primary findings: Patients receiving telemedicine-based evaluation were more likely to receive thrombolysis (23.5% vs. 3.8%) with a shorter time to treatment (17 minutes vs. 33 minutes).
- Other notes: Stroke education delivered via telemedicine was as effective as local education.

8. Meidl, et al. American Journal of Health System Pharmacy, 2008. Implementation of pharmacy services in a telemedicine intensive care unit.
- Study design: Case study
- Setting: 13 acute care hospitals

- System design: continuous off-site ICU pharmacist availability
- Patients: not reported
- Time period: 3 months
- Primary findings: Pharmacists reviewed and verified all medication orders; consulted for ICU physicians regarding medication choice and dosing; consulted for ICU nurses regarding preparation, compatibility and administration issues. There were 817 remote ICU pharmacist interventions, predominately regarding antibiotic coverage (25%), drug therapy questions (25%) and formulary support (13%).

9. Forni, et al. Annals of Pharmacotherapy, 2010. Evaluation of the impact of a tele-ICU pharmacist on the management of the sedation in critically ill mechanically ventilated patients.
- Study design: Before-after
- Setting: 5 ICUs in a single academic medical center
- System design: overnight off-site ICU pharmacist availability
- Patients: 2152
- Time period: 2 months
- Primary findings: Patients in the intervention period were more frequently subject to pharmacist intervention (sedation-related interventions per 100 patient days: 4.4 vs. 0.9, $p<0.001$). Mechanically ventilated patients receiving continuous intravenous sedation in the intervention period were more likely to receive documentation of their eligibility for a sedative interruption (49% vs. 43%, $p <0.001$). Among those with documented eligibility, a sedative interruption was performed more frequently in the intervention group (54% vs. 45%, $p<0.001$.
- Other notes: There were no differences in unadjusted clinical outcomes between groups.

Original research, primary non-clinical evaluation

1. Tang et al. Critical Care Medicine, 2007. Workflow in intensive care unit remote monitoring.
- Study design: Time-and-motion
- Setting: ICU telemedicine remote monitoring facility
- System design: continuous off-site intensivist monitoring
- Subjects: 13 clinicians (7 nurses, 6 physicians)
- Primary findings: Physicians and nurses spent 70% and 46% of their time in remote monitoring, respectively. Nurses spent 30% of their time maintaining health records. Physicians accessed in-unit clinical information more frequently than nurses (42 vs. 17 times per hour. Live video was accessed approximately 10 times per hour in both groups.

2. Stafford, et al. Critical Care Nursing Clinics, 2008. Working in an eICU unit: life in the box.
- Study design: Semi-structured interviews and ethnography
- Setting: ICU telemedicine remote monitoring facility
- System design: continuous off-site intensivist monitoring
- Subjects: 40 telemedicine clinicians (nurses and physicians)
- Primary findings: Social interactions between telemedicine team members were common. Nurse-physician collaboration within the unit was facilitated by mutual respect. Physical stressors and mental stressors were common and usually related to fatigue, boredom and workstation ergonomics. Effective collaboration with the bedside caregivers was a major challenge. Collaboration was improved through a non-judgmental

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communication style, proper camera etiquette, and endorsement of a supportive rather than primary role. Still, beside caregivers were often resistant and skeptical of telemedicine.

3. Berenson et al. Health Affairs, 2009. Does telemonitoring of patients—the eICU—improve intensive care?
- Study design: Semi-structured interviews
- Setting: 24 hospitals or health systems, five of which had adopted ICU telemedicine
- System design: continuous off-site intensivist monitoring
- Subjects: Hospital Chief Medical Officers, telemedicine directors, physician ICU directors, national experts in ICU quality
- Primary findings: Among telemedicine adopters the major barrier to adoption was the costs of implementation, operation and staffing. This barrier was overcome primarily by a desire to improve quality, not an expectation of future cost savings. Telemedicine non-adopters perceived that the potential benefits did not outweigh the costs, and that telemedicine might purely shift intensivist access rather than expand access. A majority of hospitals, even those with ICU telemedicine, had daily intensivist coverage and met Leapfrog coverage standards.
- Other notes: Interoperability with other hospital IT systems was a major concern. Some hospitals saw telemedicine as a way to build relationships with smaller community hospitals.

e-Appendix 2.

DISCLOSURE STATEMENTS

Authors' Note: To maximize transparency about potential financial or ideological conflicts which could influence the working group proceedings, we asked all participants to complete a universal disclosure statement prior to the conference. In this Appendix we provide both the disclosure template and each participant's individual disclosures.

The complete rationale behind the concept of universal disclosure is described in the initial paragraphs of the disclosure template. Additional information needed to interpret the disclosure tables is also found in the template. As well as being presented here, the complete list of disclosure statements was disseminated at the conference.

The Research Agenda in ICU Telemedicine: Financial Disclosure Statement

Conflicts of interest may arise when financial and intellectual interests conflict with the primary goals of a research project or consensus conference. Rather than exclude participation, our approach is to be transparent about the conference participants' potential competing interests. Importantly, we are not asking participants to subjectively identify which financial relationships are relevant to this particular conference, a process that is itself subject to potential bias. Instead, in an effort to maximize transparency we are asking participants to disclose all financial relationships within the last two years, as well as other interests that reasonable stakeholders may perceive as influencing the conclusions and outcome of the conference.

Statements will be reviewed by the conference chairs, circulated to conference participants and included as an appendix of the report and any submitted manuscripts. Type or write "none" if there is nothing to disclose in a given category.

1. Name:

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2. Financial relationships: In the past two (2) years or in the foreseeable future I have received or will receive funds from the following entities (list all regardless of amount):

Grants from for-profit companies, including contracted research
Grants from non-profit agencies
Consulting fess, paid advisory board, or stipends
Honoraria or lecture fees
Patents or royalties
Stock or stock options in biomedical companies, excluding diversified mutual funds

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3. Employment: (check one and complete)

❑ I am employed by the following non-profit or government entity:

❑ I am employed by the following for-profit entity:

4. Non-financial interests: Please disclose any non-financial interests (i.e. personal, professional, political or institutional) that a reasonable reader would want to know about in relation to intensive care medicine. These may include research directions, pending grant applications, or others:

Non-financial interests

5. Family disclosures: Please disclose any financial relationships, employment or non-financial interests of your spouse/non-adult children that a reasonable reader would want to know about in relation to intensive care medicine:

Family disclosure

The completed form can be e-mailed to Jenny Nemkovich at jnemkovich@chestnet.org or faxed to 847-498-5460.

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AHRQ ICU Telemedicine Research Conference

Conflict of Interest Information as provided by the attendee. Please see disclosure template for additional information about each category

NAME	Grants from for-profit companies, including contracted research	Grants from non-profit agencies	Consulting fess, paid advisory board, or stipends	Honoraria or lecture fees	Patents or royalties	Stock or stock options in biomedical companies, excluding diversified mutual funds	I am employed by:	Non-financial interests	Family disclosure
Derek Angus	Eisai, Inc, Woodcliff Lake, NJ	NIH	- Eisai, Inc, Woodcliff Lake, NJ - Eli Lilly Inc, Indianapolis, IN - JAMA, Chicago, IL - Wyeth Pharmaceuticals, New York, NY - Novartis Pharmaceuticals Corp., East Hanover, NJ - bioMerieux	none	none	none	University of Pittsburgh Medical Center (non-profit or government entity)	none	none

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			Inc, Durham, NC - Roche Pharmaceuticals in the US, Nutley, NJ						
Mary Pat Aust	none	none	none	none	none	none	American Association of Critical Care Nurses (non-profit or government entity)	none	none
Connie Barden	none	none	none	AACN chapters Hospitals - honoraria	none	none	Baptist Health South Florida (non-profit or government entity)	none	none
Robert Berenson	none	The Commonwealth Fund, California Healthcare Foundation, Robert Wood Johnson Foundation, Kaiser Family Foundation, Disease Management	Rand Corp, Pacific Business Group on Health	The Washington Hospital Center, MAGS, Smith Richardson Foundation, Univ of Colorado School of Medicine, Project Hope, Hanley Forum,	Johns Hopkins University Press	none	The Urban Institute and Fuqua School of Business, Duke University (non-profit or government entity)	none	none

		Assn of America, ACCP, European Union, Medicare Payment Advisory Commission, Affinity Health Care, Dept of HHS, American Enterprise Institute, New America Foundation, Smith Richardson Foundation, Centers for Medicare and Medicaid Services, RII Inc, National Committee for Quality Assurance, Center for Studying Health System Change,		Wellpoint Insurance Co, Center for Studying Health System Change, Institute of Medicine as a Profession, Center for Healthcare Strategies, Summa Health, Emory University, NAP, Research Foundation for Mental Hygeine, National Medical Association, AAMC, Maryland Society of Anesthesiology, New York Academy of Medicine, National PACE Assoc, American					

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		Academy Health		College of Radiology, MASS Medical Society, Center for American Progress, Martin's Point Health, Academy Health, United Hospital Fund, Soceity of General Internal Medicine					
Elizabeth Cowboy	none	none	VISICU: activation support physician - provided on-site consultative services to new ICU telemedicine clients, non-continuing	none	none	none	Advanced ICU Care, St Louis , MO (for-profit entity)	Medical Director of Advanced ICU Care, a for-profit company that offers broad-based quality improvement services to hospitals using a variety of staffing approaches, including telemedicine	none

Peter Cram	none	- NIH (NCRR, NHLBI, NIA) - Robert Wood Johnson Foundation - VA	Vanguard Health	none	none	none	University of Iowa (non-profit or government entity)	none	none
Clifford Deutschman	none	NIH	none	Visiting Prof., Dept of Anesthesiology, Rush Medical University Visiting Prof., Dept of Anesthesiology, Oregon Health and Science University	none	none	University of Pennsylvania (non-profit or government entity)	Patents Pending – 1. Use of caffeine in sepsis-induced organ dysfunction, 2. Use of a TAT-protein-Delta-protein kinase C fusion protein in acute lung injury and ARDS, 3. Use of an adenoviral vector to enhance HSP70 expression in lung injury, 4. Use of TAT-HSP70 fusion	none

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								protein in acute lung injury	
Dee Walker Ford	none	2009-2011 NIH Challenge Grant Critical Care Excellence in Sepsis and Trauma-CREST 1RC1MD004405-01 NIH, NCMHD CREST uses transformational approaches to address rural health disparities by combining an educational program with telemedicine consultation at rural SC hospitals to improve outcomes in sepsis and trauma **Role: Principal Investigator**	none	CME honoraria for lectures on sepsis at local, regional medical centers	none	none	Medical University of South Carolina (non-profit or government entity)	none	none

Victoria Freeman	none	Cooperative Agreement with the Office of Rural Health Policy (ORHP), Health Resources and Services Administration (HRSA), US Department of Health and Human Services (USDHHS). Contract with the Maternal and Child Health Bureau, HRSA, USDHHS	Consultant to Mountain Management Company	Honorarium from NORC at the University of Chicago	none	none	University of North Carolina at Chapel Hill (non-profit or government entity)	Research interest in health care in rural America including but not limited to intensive care medicine.	none
Nicholas Hill	Actelion, Bayer, Genzyme, Gilead, Pfizer, Respironics, United Therapeutics	National Institutes of Health, Pulmonary hypertension Association	none	none	Blackwell Publishers, Up-to-date, Humana Publishers	none	Tufts Medical Center (non-profit or government entity)	none	none
Theodore Iwashyna	none	National Institutes of Health Society for Critical Care	none	none	none	none	University of Michigan (non-profit or government entity)	none	none

		Medicine							
Judi Jacobi	none	none	none	CareFusion – Educational grant to Educational Review Systems program on insulin therapy & ICU glycemic control	none	Abbott labs, Baxter, Cardinal Health, CareFusion, Edwards Lifesciences, Intuitie Surgical, MetroHealth Solutions, Merck, Pfizer	Methodist Hospital/Clarian Health – we use Cerner TeleICU monitoring (non-profit or government entity)	Task Force Chair, SCCM Guidelines for IV Insulin	none
Jeremy Kahn	Ongoing non-financial relationship with the Cerner Corporation, which provides access to data for research purposes	National Institutes of Health Society of Critical Care Medicine	none	American Thoracic Society	none	none	University of Pennsylvania (non-profit or government entity)	My research interests include the organization and management of critical care/ICU workforce and staffing. My employer (University of Pennsylvania) contracts with VISICU to provide	none

								telemedicine services in some of its ICUs.	
Ruth Kleinpell	none	Grants: American Association of Critical Care Nurses, 2008, Philips Critical Care Research Grant for research study: Targeting Hypoglycemia in the ICU With Evidence Based Practice Strategies Agency for Healthcare Research and Quality, 2009-10, year 4 of a 4 year RO1 "Discharge and Telehealth for Cardiac Elders" Prince Foundation	none	Faculty presenter, honorarium: American Academy of Nurse Practitioners conference, 2009, 2008 American Association of Critical Care Nurses National Teaching Institute, faculty honorarium, 2009 National Conference for Nurse Practitioners, faculty honorarium, 2008, 2009	none	none	Rush University College of Nursing (non-profit or government entity)	none	none

		grant, 2008-2010 "Generating Solutions to Improving Nursing Morale"							
Benjamin Kohl	none	none	none	none	none	none	University of Pennsylvania (non-profit or government entity)	Telemedicine at the University of Pennsylvania currently utilizes VISICU system	none
Craig Lilly	none	New England health care institute	none	NAMDRC 2009	No financial conflicts or revenue from my patents.	none	University of Massachusetts Medical School (non-profit or government entity)	Research interest in the effects of Tele-ICU on outcomes	Wife is an employee of CeQur, a device company that focuses on outpatient diabetes products.
David Longnecker	none	I am the PI on QI initiative grant among 15 academic medical centers	Special Government Employee: NASA Advisory	none	none	none	Association of American Medical Colleges (non-profit or	I brought the Visicu system in to the Univ. of Pennsylvania	none

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		pending from RWJF; start date June 1 2010.	Council (NAC) and NAC Exploration Committee				government entity)	Health System and am generally an enthusiast for this type of work (concept, not specific company), for I believe it is one of what will/should become a host of new initiatives to provide virtual "physician extenders" that enhance care and quality without adding vast additional human resources.	
James Mathers	none	none	American College of Chest Physicians	none	none	AMGEN, Pfizer	Pulmonary Associates of Richmond (not-for-profit	Particpates in an e-ICU Program	none

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							entity)		
Justine Medina	none	none	none	none	none	none	American Association of Critical Care Nurses (non-profit or government entity)	none	none
Bela Patel	Actelion, Pfizer	none	Actelion, Gilead, United Therapeutics	Actelion, Gilead	none	none	The University of Texas Health Science Center (non-profit or government entity)	none	none
Dena Puskin	none	none	none	none	none	none	Health Resources and Services Administration (non-profit or government entity)	none	none

Kevin Reed	none	none	Consulting fees for private consulting related to the AACN Synergy Model for patient care	Honorarium for lecture related to AACN's Beacon Award for Critical Care Excellence	none	none	Clarian Health (non-profit or government entity)	none	none
Marta Render	none	none	none	none	none	none	VA Getting at Patient Safety Center (non-profit or government entity)	none	none
Selwyn Rogers	none	none	N?A	none	none	none	Brigham and Women's Hospital (non-profit or government entity)	none	none
Jeffrey Rothschild	Research Support (PI) : McKesson Corporation 2/10–11/10	Research Support (PI) : Rx Foundation - 12/07–3/09 American Society of Health Systems Pharmacists (ASHP) Foundation	Consulting – Institute for Safe Medication Practice (ISMP) 2/10	none	none	none	Brigham and Women's Hospital (non-profit or government entity)	none	none

		6/08–3/09 Shared Health (Tennessee) - 6/08–03/10							
Gordon Rubenfeld	NIH, Robert Wood Johnson Foundation	Advanced Lifeline Systems, Siemens, Bayer, Byk-Gulden, AstraZeneca, Faron Pharmaceuticals, Cerus Corporation	Bayer, DHD, Lilly, Hospira, Cerner, Pfizer, KCI, American Assoc, for Respiratory Care, American Thoracic Society, NIH, Alberta Heritage Foundation for Medical Research (Prior consulting relationship with Cerner relating to ICU information technology)		none	none	Sunnybrook Health Sciences Centre (non-profit or government entity)	none	none
Anne Sales	none	Canadian Health Services Research Foundation; Alberta Innovates-Health Solution (provincial public funding agency in health); Canadian Institutes for Health Research	National Institute for Nursing Research (NIH) funded project	Michael Smith Foundation for Medical Research (honorarium for participating in review panel—provincial funding agency in British Columbia)	none	none	University of Alberta (non-profit or government entity)	None; my current research is in long term care and acute, non-ICU care	none

Damon Scales	none	- New Investigator Award, Canadian Institutes for Health Research - Grant, Heart and Stroke Foundation of Canada and Canadian Institutes for Health Research - Grant, Ontario Ministry of Health and Longterm Care AFP Innovation Fund	Advisory Board (2008), Baxter Healthcare	none	none	none	Sunnybrook Health Sciences Centre (non-profit or government entity)	- Principal Investigator, Ontario MOHLTC ICU Clinical Best Practices Telemedicine Network Project - Principal Investigator, Strategies for Post-Resuscitation Care Network Project	none
J. Bryan Sexton	none	AHRQ RWJ	none	Yes	none	none	Duke University Health System (for-profit entity)	Research Direction: Caregiver Burnout, Quality & Safety Culture Dr. Sexton is the creator of the Safety	none

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								Attitudes Questionnaire (SAQ) which he has licensed to Pascal Metrics; a company who manages the customer service and technical support for survey administration.	

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